

# The Larvæ of the European *Blepharoceridæ*

(DIPTERA)

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## INTRODUCTION

We described, during the war, several new species of the larval stages of *Blepharoceridæ* from the European mountains Caucasian and Balkan, where these Diptera had not yet been collected.

Before the war, there were only 3 larval species of that family known in Europa. Then from my excursions in the Caucasian and Balkan I brought six new species belonging to the genus *Liponeura* and *Blepharocera*. The descriptions published during the war were probably inaccessible to the greater scientific Society.

On the invitation of Mr. LESTAGE, I shall now give a short review of all hitherto described larvæ of the European *Blepharoceridæ*.

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### LARVÆ.

These larvæ are most interesting insects.

The whole body consist of *eight* segments (not *seven* = COMSTOCK) of which the first is a cephalothorax-like segment, containing the head, thorax and the first abdominal segment. It can be best seen on the dorsal chitin-plates of *Liponeura platyfrons* or larva from Zchenes-Zchali.

On the ventral side of the little dorsoventral flattened body, each of the seven segments, except the last two, bears a sucker the cavity of which extends far into the body.

I described very detailed the morphology and physiology of these suckers in a special publication (1).

These remarkable larvæ are apneustic and breathe solely by tufts of tracheal-gills attached to the undersides of the second to sixth abdominal segments. The number of gills in every tuft is used as a systematic character. Also immediately in front

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(1) KOMAREK, Die Morphologie und Physiologie der Haftscheiben der Blepharoceriden-Larven. (*Sitzunsber. Königl. Böhm. Ges. Wissensch. Prag* 1914, p. 1-28, 10 fig.).

of the anus and behind the last sucker are four membranous sacs provided with tracheæ. The last were homologized (by WIERZIEJSKI) with the four anal gills of *Chironomus*.

The whole body is leg-less but with six pairs of conical leg-like appendages, on the sides of are sometimes short bristled feelers (genus *Liponeura*).

The head bears except the two very little eyes a pair of slender, long and joint-less or two jointed and short antennae. Mostly important for systematical purposes is the form of the chitin dorsal-plates, which lie in every segment and bears sharp points, thorns or warts. The real locomotion organs of the larvæ are the six suckers. With them the larvæ can hold so fast to the rock that the body, when disturbed, is more readily torn in two than dislodged as a whole. These suckers are surely the best air-pump which we know in the whole animal Kingdom and their princip and mode of use are the same as in the air-pump apparat constructed by man.

The locomotion is always in lateral direction; the moving larva loosens the hold of three suckers at a time and swings to one side the hinder half of the body thus released, the suckers again attach this part of the body in its new position, and the other half of the body is loosened and swung over, and thus a slow lateral translation of the larva takes places.

The larvæ like the lip of a fall, the rocks of cascades and the sides of apot-hole in which the water is ever whirling and boiling. They must have the highly aerated, swift water of the stream's center and therefore cannot live in stagnant or even quiet or slow running water. They can live only in clear, swifty running streams with a rapid fall, and this practically limits these insects to mountain regions. Their whole organization is also an excellent adaptation to such conditions.

The larvæ feed chiefly on Diatoms, although other food is doubtless taken.

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## II. — PUPÆ.

The *pupa* differs greatly in form from the larva

It is strongly convex on the dorsal side, where the skin is hard and dark brown or black, and is perfectly flat on its ventral

aspect, which lies smoothly against the rock. The wings and legs lie folded on the ventral aspect, where the cuticula is very delicate, soft and transparent. The prothorax bears a pair of breathing-organs, projecting dorsally, each composed of four thin, double-walled plates.

The pupa is found in the same places as the larva. The pupæ are apt to occur like the larvæ closely clustered together with the heads pointing up-streams. They cling to the rock by means of six pads, three of each lateral margin of the ventral side of the abdomen. These pads are not like the suckers of the larva whose can be voluntarily loosened, but the permanently **attach the pupa to the rock**. It is not my programm to describe the pupa of every species, especially because they rarely show any specific character.

### *Geographical distribution.*

The *Blepharoceridae* are in regard to the geographical distribution very interesting. It has been said that they live only in mountain regions, and there are some in Europe very wide spread species and such, which can be found only in certain mountains or valleys.

For exemple, in Caucasian, nearly every valley has its specific species and this is evidently caused by the local (geographical) isolation: whilst only two species can be found in the whole of the central European mountains.

I shall again refer to this strange phenomenon latter.

Before the war, only two genera with 3 *larval* species were described from Europe, whereas many American species were known and described.

On two excursions in Caucasian and Balkan, I lern of the existens of farther six new species belonging to the genus *Liponeura* and *Blepharocera*; of course there are many more species which were not yet been discovered.

The last year described Prof. HETSCHKO the larva of *Hapalothrix lugubris*.

That are the all larva which we hitherto know from the family *Blepharoceridae* in the whole of the Europe. They are so closely related together that one can very difficult give a practical classification of the named three genera.

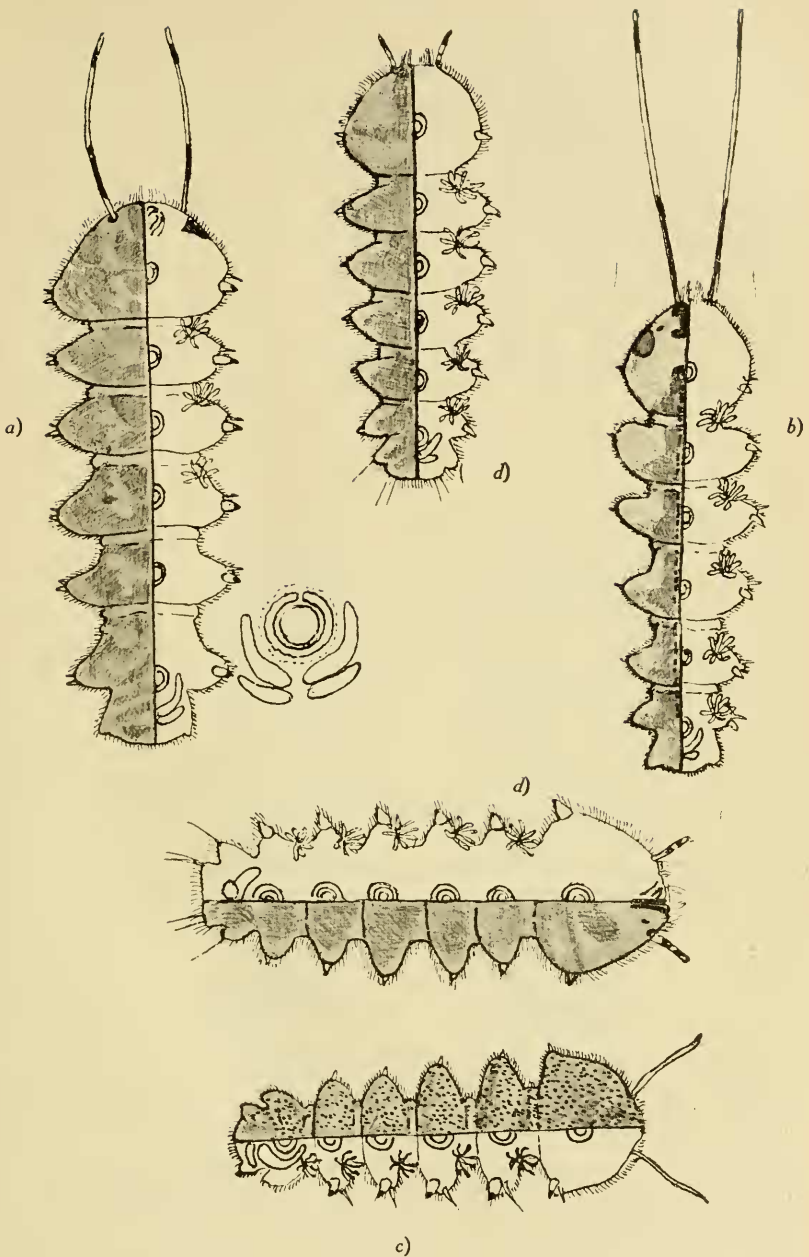


Fig. 1. — a) Larva of *Liponeura brevirostris*.  
b) " " *Klapálekí*.  
c) " " *cinerascens*.  
d) " *Blepharocera fasciata*.

SYSTEMATIC ACCOUNT.

1. Genus *LIPONEURA* Lw.

Antennae are very long and jointless.

This peculiarity belongs only to Centr. European and Balkan-species.

All Caucasian larvæ have antennæ two jointed and short (except the *Liponeura caucasica*).

Every bunch of tracheal gills has seven tracheal threads. Claws and feelers on first six segments.

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1. *Liponeura cinerascens* Lw. (fig. 1 C).

This larva is one of the most common *Blepharoceridæ* in the whole of Central Europa.

It was described and pictured by HETSCHKO, in *Wien. Ent. Ztsch.*, 1912.

The dorsal side of the body is dirty green, the ventral is pale. Antennæ are as long as the first body-segment.

The diameter of the suckers measures 1/4 of the segment latitude.

*Liponeura cinerascens* is very common in the Alps, Carpathians, Apenins and in all Central and West European mountains of circa 1000 m. altitude. So for instance in Germany (Harz, Schwarzwald), in Czechoslovakya (Doupov, Sudety, etc.). I also very often found it in Balkan (Mus-alla, Rhodope, etc.).

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2. *Liponeura brevirostris* Lw. (fig. 1a).

This is the second central European species.

It does not occur so often as the former, but never theless one can find it every where in high Central-European mountains.

WIERZIEJSKI described the larva firstly from the Carpathian and afterwards many other authors have pictured it in different articles.

The colour is the same as in *L. cinerascens* L .

Antennae are 1 1/2-2 x as long as the first body segment.

The suckers measure 1/5th of the segment latitude.

Their geographical distribution is the same as of *L. cinerascens* (France, Switzerland, Germany, Italy, Polonia, Czechoslovakia, Alps, Carpathians and the whole Balkan).

Although I searched for both species in various parts of the Caucasian and Armenia it appears to me, that they do not exist in these countries.

3. *Liponeura platyfrons* KOM. (fig. 2).

KOMAREK, *Sitzungsber. Königl. Böhm. Ges. Wissensch. Prag.*, 1914, p. 4, pl. II, figg. 5, 6.

Antennae quite Blepharocerid-like short and two-jointed.

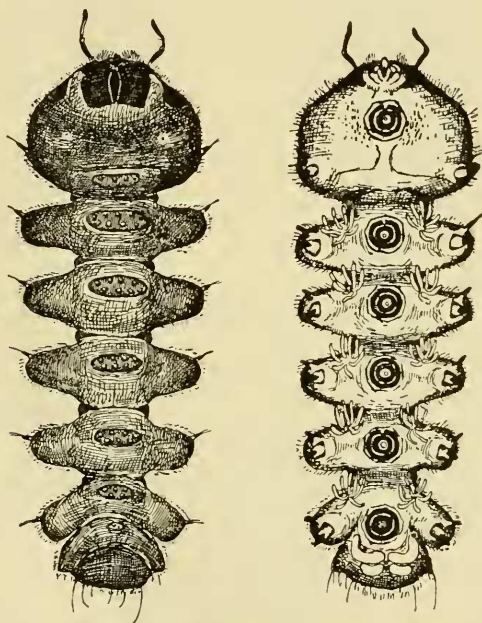


Fig. 2. — Larva of *Liponeura platyfrons* KOM.

On the dorsal side of every one of the first seven abdominal segments are elipsoid chitin plates with little sharp points.

I found this larva in Svanetia in Caucasian where it lives only in the deep valley which leads from the Ingur-river near the village Kali, to the Gereso-glaciers, on foot of *Dzangu-tau* mountain.



In the same place, I found another species also belonging to the genus *Liponeura*.

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4. *Liponeura caucasica* KOM (fig. 3).

KOMAREK, *loc. cit.*, p. 3, pl. II, fig. 1-2 (var. of *L. brevirostris* Lw.).

This larva shows in the form of the antennae a real relation between Centr. European *Liponeura* and those from Caucasian.

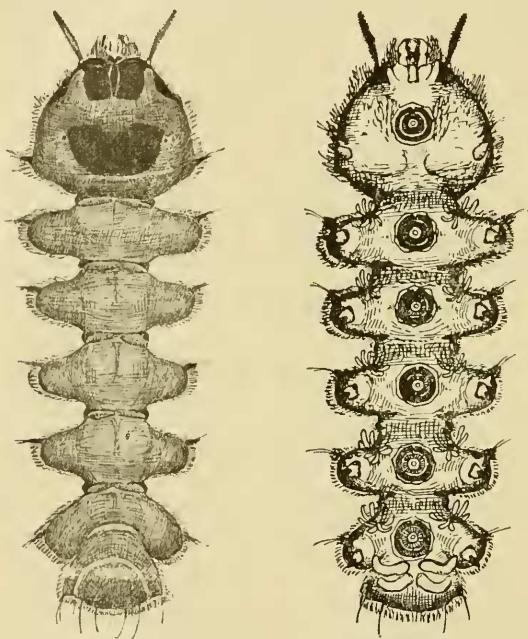


Fig. 3. — Larva of *Liponeura caucasica* KOM.

Their antennae are straight and jointless, but only half as long as the first segment. The whole form is entirely similar to the larva of *Liponeura brevirostris*, and I described it firstly as a variety of *L. brevirostris*. The adult shows but quite different marks and can be certainly behold as a new species.

It lives also in the valley of Dzangu-tau glaciers.

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There are farther two larval-species from Caucasian the imago of which I could not find. Since they take very different forms, I shall describe them as now larvæ, but without any specific name.

Lacking the imagines, I can not judge to which genus they should belong, but from my experiences in high Caucasian mountains other genera, except the genus *Liponeura*, in my opinion does not occur. These countries are too cold for the species of the genus *Blepharocera*.

First of these two is the

5. *Larva* (LIPONEURA) from *Zchenes-Zchali* (fig. 4).

KOMAREK, *loc. cit.*, p. 7, pl. II, figg. 7, 8.

This larva resembles the genus *Curupira*, but it cannot be identified with on account of geographical reasons because *Curupira* was hitherto only found in south America. The colour on the dorsal side is gray, on ventral white. The body is much broader and especially much higher than in all even described larvæ. The skin is nearly smooth.

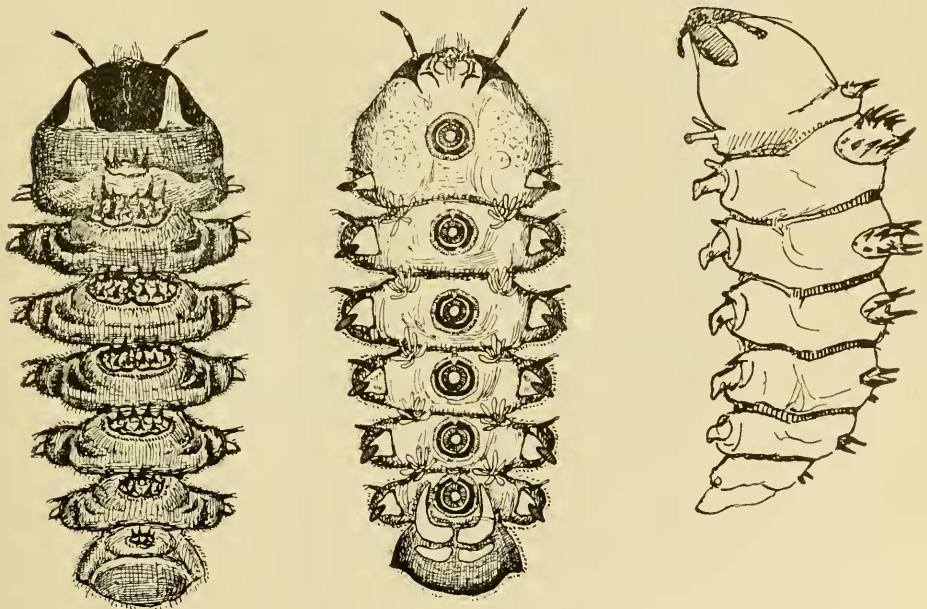


Fig. 4. — Larva of *Liponeura* of *Zchenes-Zchali*.

Antennae are short, two jointed.

Claws with bristled feelers are thick and large.

The most wonderful sign are the seven, large, ellipsoid chitin-plates, which are placed on the dorsal side of the first seven segments. All plates are rounded with high prominent, sharp thorns.

I found this larva also in Caucasian (in Svanetia) in the Zchenes-Zchali river, near the village Cvelieri.

The second is the

6. *Larva LIPONEURA*) from *Betszo* (fig. 5).

KOMAREK, *loc. cit.*, p. 7, pl. II, fig. 3, 4.

This larva has also a quite different appearance from all hitherto known species and one can evidently see that it is a new species.

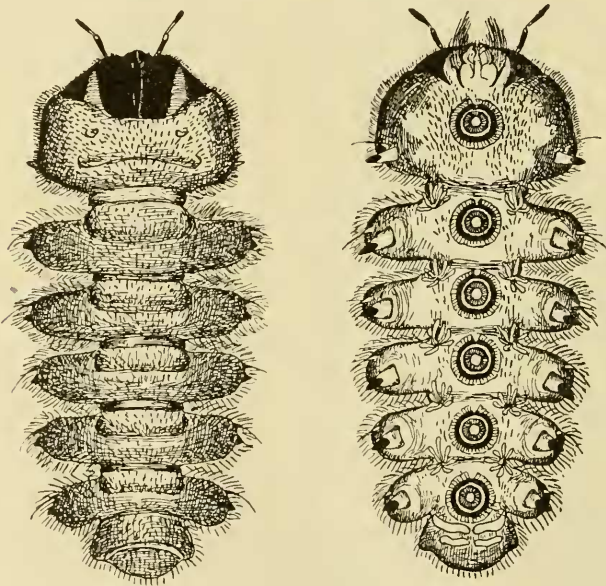


Fig. 5. — Larva of *Liponeura* of Betscho.

All segments are very broad against the length.

The colour is on the dorsal side a dark green, on the ventral white.

The whole body is densely covered with hairs, much more than any other larva except the *Hapalothrix lugubris*. There are not chitin-plates with thorns or warts.

The claws are long and large and on their side are very long bristled feelers.

Antennae are short, two jointed.

I found this larva in Svanetia (Caucasian) in a small river which leads from the Uschba-glacier through the villagge Betczo into the Ingur-river.

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In Balkans with the exception of the two mentioned and common species (*Lip. cinerascens* and *brevirostris*) I found three new *Liponeura* but only one in a larval stage.

It was :

#### 7. *Liponeura Klapàleki* WIMMER (fig. 1b).

This larva is very similar to the *L. brevisrostris* but it differs in the important point: the length of antennae.

The antennae measure, in *L. brevisrostris* 3 mm., whilst, in *L. Klapaleki*, they are twice as long (6 mm.) and nearly as 3/4th of the whole body. The first body segment is, in *L. Klapaleki*, longer than broader; in *brevirostris*, on the contrary, broader than longer.

*L. Klapaleki* has much smaller suckers.

I found them in large numbers in Bulgaria, near Sofia, at the foot of the Vitosà mountain.

#### 2. Genus *Blepharocera* MACQ.

Larvæ differs from the gen. *Liponeura* only in the absence of bristled feelers on the sides of the claws. Antennae are always, short, two jointed, never long and straight.

The species of that genus always live in warmer countries and does not occur in cold mountain regions.

Only two species are known from Europa.

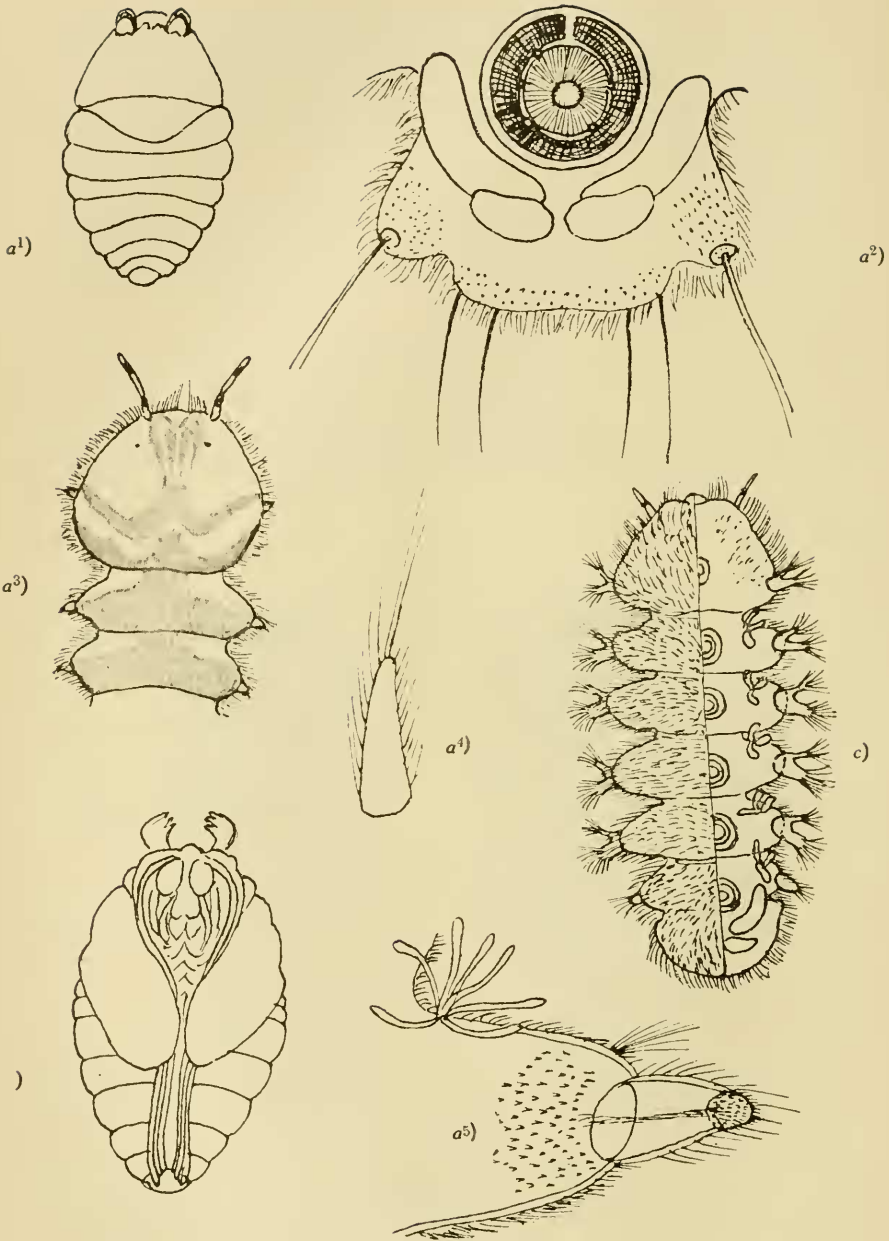


Fig. 6. — a<sup>1</sup>) Pupa of *Blepharocera fasciata*.  
a<sup>2</sup>) Ventral view of the end of the larva of *B. fasciata*.  
a<sup>3</sup>) First body-segment of the larva of *B. fasciata*.  
a<sup>4</sup>) The feeler of the same.  
a<sup>5</sup>) Claw in ventral aspect of the same.  
b) Pupa of *Liponeura Sp.*  
c) Larva of *Hapalothrix lugubris*.

1. *Blepharocera fasciata* WESTW. (fig. 1d et 6a<sup>1</sup>, <sup>2</sup>, <sup>3</sup>, <sup>4</sup>, <sup>5</sup>).

The constitution of the body is always more subtle than in the *Liponeura*.

The colour is yellow-brown, on the ventral side yellow pale. A dark brown stripe leads on the dorsal side from the head to the end. The whole body is covered with short, fine hairs. Antennae are short, two jointed and white with a black top.

The first six segments bear only the claws, not the feelers. This species lives at the foot of mountains where the climate is warmer but the postulate living conditions (cascades and cataracts) are still present.

We never find it therefore in Central Alps, where the *Liponeura* is common, but always in lower regions. *Bleph. fasciata* lives in Middle and South Europa (Spain, France, Italy, Balkan). In Caucasian although I searched for it I did not find.

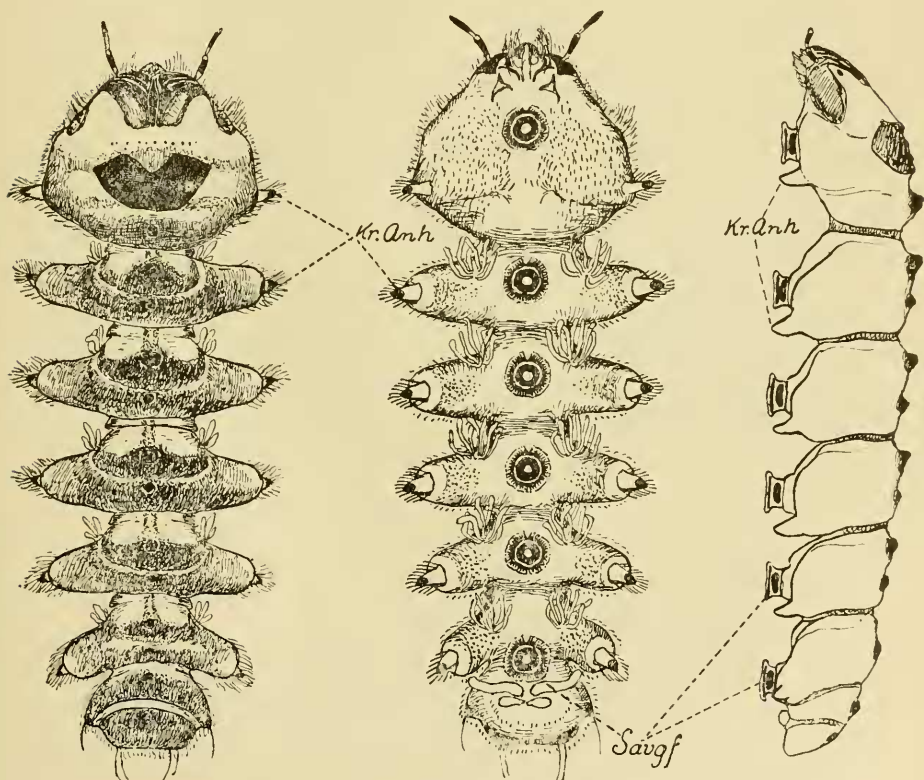


Fig. 7. — Larva of *Blepharocera armeniaca* KOM.



2. *Blepharocera armeniaca* KOM. (fig. 7).

KOMAREK, *loc. cit.*, p. 9, pl. II, figg. 9, 10.

This larva bears the same system. charakters which were mentioned at the former species. Only in one remarkable sign it differs very radical from the last.

Every segment bears in the middle of its dorsal side two prominent chitin warts the proximal of which is always higher and larger than the distal. Both are visible especially in profile.

This larva is very common in Azerbeidschan and North-Persia where it lives under the same conditions as the *Blepharocera fasciata* in South Europe.

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3 Genus *Hapalothrix* Lw.

Antennae are short, two-jointed. The leg-like appendages (claws) are long and dichotomized in its end and every seems to be composed from the united claw with the feeler.

*Hapalothrix lugubris* Lw. (fig. 16c).

HETSCHKO, *Wien. Ent. Zeit.*, 1919.

Is the single species, which we hitherto know of that genus. Their body is black and very densely covered with long hairs. Every bunch of tracheal gills has only 3 threads.

Prof. HETSCHKO has found it in Monte Rosa (Italy).

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CONCLUSION.

These are all species of european *Blepharoceridae* the larval stages of which were described and pictured althoug there are many more species, where for an long time only the imago is known. Several of them are dubiously described and their existence is not proved.

The european species, where only imagines were described are :

1. *Liponeura decipiens* BEZZI (?).
2. *Liponeura (Philorus) bilobata* Lw.
3. *Liponeura Komareki* WIMMER (?).
4. *Liponeura cordata* WIMMER (?).
5. *Apistomyia elegans* BIGOT.

According to the mentioned geographical distribution we see two interesting things.

Firstly that the genus *Liponeura* is a truly high mountain inhabitant, whereas *Blepharocera* lives only at the foot of mountains and always in warmer places. We never find it in the neighbourhood of glaciers as the *Liponeura*.

On account of that *Blepharocera* has a much wider distribution than the species of the genus *Liponeura*.

For that reason also the latter genus possesses so many different species because off its life in isolated mountains and their valleys has caused also a different development in the same manner as WALLACE has described in his « Island's life ».

We have for instance in the whole of Europe only two species of *Blepharocera*, whereas we have already circa 10 species of the *Liponeura*-genus, but this number will in the future be greatly increased as one can see for inst. in Caucasian, where nearly every valley has its specific species. It is caused by « the local isolation, » and it seems be very extraordinary that we meet with such things among the flying insects.

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